

Leszynsky. (Wm.)

An Abstract of a Lecture on the
Significance and Value of
Pupillary Phenomena in
Nervous Disease.

*Delivered at the New York Post-graduate
Medical School and Hospital,
November 21, 1887.*

BY

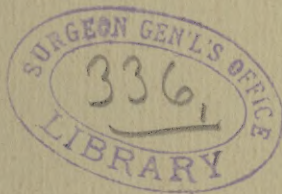
WILLIAM M. LESZYNSKY, M. D.,

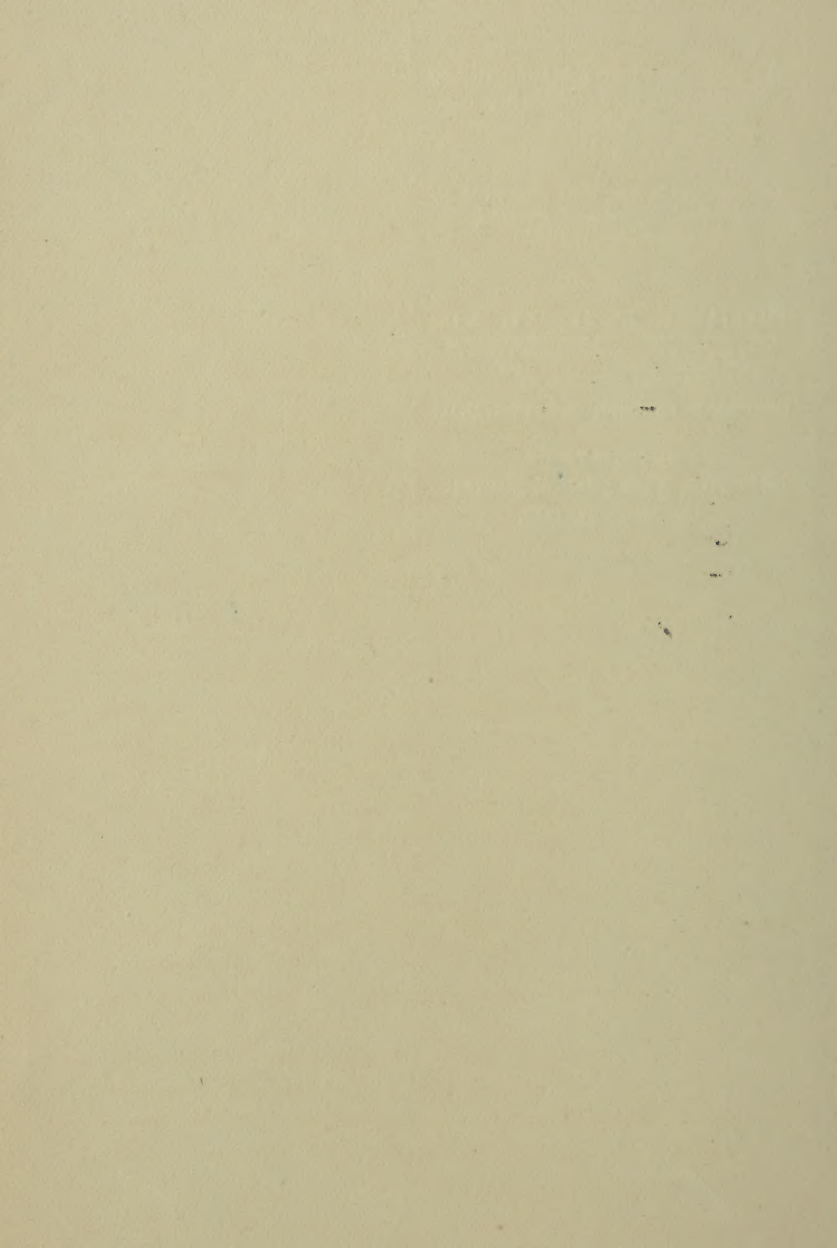
INSTRUCTOR IN MENTAL AND NERVOUS DISEASES AT
THE NEW YORK POST-GRADUATE MEDICAL SCHOOL
AND HOSPITAL; ATTENDING NEUROLOGIST TO
THE DEMILT DISPENSARY, ETC.

(Reported by LOUISE FISKE-BRYSON, M. D.)

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AN ABSTRACT OF A LECTURE ON THE
SIGNIFICANCE AND VALUE OF
PUPILLARY PHENOMENA IN NERVOUS DISEASE.

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BY WILLIAM M. LESZYNSKY, M. D.,

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PUPILLARY phenomena in nervous troubles possess a distinct value as corroborative evidence. In certain affections they appear early and with decided regularity. Taken alone, and separated from other signs, it would be unwarrantable to consider them indicative of any pathological condition of the nervous system. Yet in connection with other symptoms they are valuable aids to diagnosis. Their importance lies in the fact that an intelligent comprehension of their real significance enables us in many instances to distinguish between organic and functional nervous disease.

A word about the nerve and blood supply to the iris. "The pupil may be considered to be under the dominion of two antagonistic mechanisms; one a contracting mechanism, reflex in nature, the third nerve serving as the effer-

ent, and the optic as the afferent tract; the other a dilating mechanism, apparently tonic in nature, but subject to augmentation from various causes, and of this the cervical sympathetic is the efferent channel. Hence, when the optic or the third nerve is divided, not only does contraction of the pupil cease to be manifest, but active dilatation occurs on account of the tonic dilating influence of the sympathetic being left free to work. When, on the other hand, the sympathetic is divided, this tonic influence falls away and contraction results. When the optic or the third nerve is stimulated, the dilating effect of the sympathetic is overcome and contraction results; and when the sympathetic is stimulated, any contracting influence of the third nerve which may be present is overcome and dilatation ensues." (M. Foster.)

The blood-supply is remotely from the internal carotid artery, and immediately from the ophthalmic and its branches. The circulation in the pia mater has the same remote source, yet only in an anastomotic sense can it be considered the same as that of the iris. Abnormities of cerebral circulation may exist without evidence of such disturbance in the eye. On the other hand, changes in the pupil may point to pathological conditions of the brain or spinal cord. Relatively, eye-symptoms offer confirmation or negation of previous provisional diagnoses.

All local diseases of the eye must be excluded before we think of some central nervous lesion or functional disorder to account for any abnormal condition that may be present. The practitioner should familiarize himself with the preliminary methods of examination for acuteness of vision and errors of refraction. A visual power of twenty twentieths excludes but one condition only—myopia. Optic neuritis or other trouble may be present. The next step is to examine the pupils carefully. They should be

mobile and of the same size and shape. Place the patient in a position facing a window. Do not allow the sun to shine upon his face. Never attempt an examination of the pupils while the patient sits or stands with his back to the light, as under such circumstances the pupils are usually dilated. It is unadvisable to examine the pupils directly in front of a gas flame. The patient is likely to and generally does "fix" upon the flame, thereby causing contraction of the pupils in accommodation, which may mislead the examiner. Direct him to gaze upon some object at least twenty feet distant in order to relax accommodation. Sufficient knowledge of ophthalmology to recognize or exclude local diseases of the eye that may affect the pupil is an essential feature in the examination we are now considering. The following method of observation should be systematically adhered to:

1. As to the size of the pupils.
2. As to their shape.
3. As to their equality.
4. As to their mobility.

Contracted pupils are generally seen when the eyes are exposed to a bright light and in persons over fifty years of age. The existence of myosis in any one under fifty years of age is almost always pathological. Contracted pupils are found in cerebral hyperæmia or congestion, and in the early stages of meningitis. They may also be due to hypermetropia or to the effect of some drug, such as eserine, morphine, pilocarpine, etc. Irritation of the third nerve at its nucleus or in any part of its course, or paralysis of the sympathetic or its branches, produces contraction of the pupil on the same side as the lesion. Myosis is frequently seen in cases of locomotor ataxia and in parietic dementia, and occasionally in cervical myelitis.

Dilated pupils exist as a normal condition in darkness

or subdued light. Unless due to local disease of the eye, their presence in an old person is always pathological, and may indicate some disturbance in the nervous system. In children the pupils are often dilated, as well as in grown persons of exaggerated reflex irritability. It is frequently an expression of increased excitability in cases of "nervousness," hysteria, etc. Mydriasis may result from the effect of drugs—such as atropine, duboisine, hyoscyamine, etc. In high degrees of myopia, the pupils are usually found dilated. This condition may also be due to cerebral or general anæmia. Paralysis of the third nerve, or irritation of the cervical sympathetic, produces dilatation of the pupil on the same side as the lesion. Dilatation of the pupils takes place during epileptic coma, in amaurosis, and in high grades of optic neuritis. It is also a manifestation of excessive intracranial pressure.

The *shape* of the pupils may vary, being distinctly different in each eye at times, or both may be alike, yet irregular. Sometimes one is round and the other pear-shaped, or triangular, or somewhat vertical or horizontal. An irregular pupil may result from the adhesive bands of a former iritis. The condition known as coloboma may be congenital, or acquired through surgery. It is a deformity in which the symmetry of the iris is destroyed by an elongated gap or cleft. Irregularity of the pupil may occasionally be observed in cases of parietic dementia without a pre-existing iritis. *Unequal pupils* never occur in health, but are observed where there is marked difference in the degree of refraction in the two eyes. They are present in parietic dementia, and, if not found at one examination, will be discovered subsequently. Unless the inequality is pronounced, it is frequently difficult to determine whether one pupil should be considered dilated or the other contracted. Unilateral dilatation may be due to some local disease of the eye; to in-

stillation of atropine or other mydriatic; to paralysis of the motor oculi, or to irritation of the cervical sympathetic on the same side; or to blindness on the affected side. Unilateral myosis may be due to an existing or a former iritis; to irritation of the third nerve, or paralysis of the sympathetic on the same side; or to the instillation of drugs. Either phenomenon may be present during an attack of migraine.

The *mobility* of the pupils should next be considered. Physiological pupillary reactions are the following:

1. Contraction to light, or direct reflex action.
2. Consensual contraction, or indirect reflex action.
3. Associated contraction in accommodation.

1. Contraction of the pupils to light, or direct reflex action, is thus investigated: Instruct the patient to gaze upon some large object at least twenty feet distant, and to keep both eyes open. The eyes are then covered or shaded. In a few moments one is suddenly uncovered and exposed to light, when, in the normal state, the pupil (which always dilates in darkness or subdued light) immediately contracts. The other eye is then tested in the same manner.

2. For consensual contraction, or indirect reflex action, the examination is conducted in the same manner as before, only both eyes are at first left uncovered. One eye is then covered, and in a moment or two is suddenly exposed, when it will be noticed that a simultaneous contraction occurs in the opposite pupil. This consensual pupillary reaction to light is owing to bilateral association of the reflex mechanism.

3. Associated contraction to accommodation is obtained with the patient in the same position. Direct him to look at some small object held within one foot of the eyes, when, in the normal state, synchronous contraction of both pupils will take place. In health the pupils dilate upon

pinching, scratching, or irritating the skin over the neck or elsewhere. This is supposed to be due to excitation of the sympathetic nerve-fibers in connection with the so-called cilio-spinal center. Abnormal conditions of the pupils are not difficult to discover if their physiological action is thoroughly understood and constantly borne in mind. Reflex action to light is lost when the eyes are blind from disease of the optic nerves or retinae. If only one eye is blind, the direct action of its pupil will be lost, but (unless there is disease of its third nerve also) the indirect or consensual action will be preserved, or may be much greater than in health. Loss of reaction to light during the epileptic paroxysm is a positive diagnostic symptom in excluding simulation.

In the condition known as the "Argyll-Robertson pupil" there is abolition of reflex action upon exposure to light, but the associated pupillary contraction in accommodation is preserved. This symptom is occasionally accompanied by myosis or inequality of the pupils, and is a valuable aid to diagnosis. It occurs in locomotor ataxia, in parietic dementia, and in some cases of disseminated sclerosis. The presence of the Argyll-Robertson pupil in conjunction with the absence of knee-jerk may be considered presumptive evidence of degeneration affecting the posterior columns of the spinal cord.

In this connection it is interesting to note that in eyes that are totally blind the pupils are generally found dilated, and fail to react upon sudden exposure to light; but at times associated pupillary contraction occurs when the patient is instructed to make an effort and act as though he were looking at an object within a few inches—by encouraging him, as it were, to indulge in a (somewhat modified) visual hallucination.

In the condition known as cycloplegia, or paralysis of

the ciliary muscle—an occasional complication or sequel of diphtheria—the contraction of the pupils to light is preserved; but, as the sufferer has become temporarily presbyopic (if the expression may be allowed) and the mechanism controlling accommodation is interfered with, the pupils fail to react for the near point. This, you perceive, is the reverse of the Argyll-Robertson pupil. When the pupil is dilated by atropine, it fails to react either to light or in accommodation, as both the ciliary muscle and the fibers of the motor oculi supplying the iris are paralyzed. This failure to respond to light is from peripheral causes.

It has been my earnest endeavor in this lecture to impress upon you, and outline for your benefit, as concisely as is consistent with lucidity, the advantages of a methodical examination of the pupils and the significance of any abnormalities they may present. The study of this too often neglected field of investigation will amply repay you for all the time, thought, and care bestowed upon it. It is one of the clinical features of many otherwise obscure conditions. As before stated, pupillary phenomena serve as corroborative evidence, affording confirmation or negation of a provisional diagnosis. I have purposely refrained from referring at length to the various local diseases of the eye which influence the pupil. This subject belongs to the broad domain of ophthalmology.



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